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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,606	08/04/2003	Darrell Rinerson	UNTYP019	1605

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EXAMINER	
BLUM, DAVID S	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/604,606	RINERSON ET AL.	
	Examiner	Art Unit	
	David S. Blum	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *26-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-30* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/12/04,2/27/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

This action is in response to the election filed 2/7/05.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-25 in the paper filed 2/7/05 is acknowledged.

2. Claims 26-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the paper filed 2/7/05.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-20, and 22-24 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Watanabe (Current-driven insulator conductor transition…(pages 3738-3740, Applied Physics Letters)).

Watanabe teaches the positive steps of claims 1-20, and 22-24 as follows.

Regarding claim 1, Watanabe teaches doping a multi-resistive material to modify at least one electrical property of the material paragraph 1), Supplies the multi-resistive material between a pair of electrodes (paragraphs 1 and 2, the material is insulative between electrical connections in a MIM structure for a memory device), applies at least one electrical pulse (paragraph 2, Watanabe does not state a selected width or maximum value, or waveform, but the pulse must have these or would then be a random, uncontrolled pulse), the pulse creates an electric filed to reversibly change the resistive material (paragraph 2, Watanabe does not teach the field is greater than the threshold field value, but must be to have the alteration effect, and must be less than the energy to damage the material as it is not damaged.

Regarding claim 2, the doping modifies the resistivity (paragraph 2).

Regarding claim 3, Watanabe teaches a resistance of 500-500,000 ohms and an amperage of 3.5 mA (paragraphs 2 and 3) on an electrode of 0.8 mm. The instant

specification teaches 100,000 ohms, currents below 10 mA, and this corresponds to a resistivity about 2 and 1.5 volts. As the reported variables of Watanabe are identical to that of the instant specification, the resultant resistivity should also be identical, as it has a mathematical relationship.

Regarding claim 4, the doping of the multi-resistive state material modifies the amount of the charge traps. This is a function of the positive steps preformed. As the positive steps are identical (as are the materials), the same functional result should occur (paragraph 1).

Regarding claim 5, the doping of the multi-resistive state material improves the data retention capability of the material. This is a function of the positive steps preformed. As the positive steps are identical (as are the materials), the same functional result should occur.

Regarding claim 6 the interface between the electrodes and the multi-resistive material causes an ohmic effect (this is inherent of resistive material between conductive layers.

Regarding claim 7, the interface between the electrodes and the multi-resistive material causes a Shottky effect. (page 3740)

Regarding claim 8, the electrical pulse reversibly changes the resistivity from a high value to a low value or from a low value to a high value (paragraphs 2 and 4) and doping modifies the magnitude of the difference from a high value to a low value (paragraph 2).

Regarding claim 9 the interface between the electrodes and the multi-resistive material causes an ohmic effect (this is inherent of resistive material between conductive layers.

Regarding claim 10, the interface between the electrodes and the multi-resistive material causes a Shottky effect. (page 3740).

Regarding claim 11, Watanabe teaches a resistance of 500-500,000 ohms and a amperage of 3.5 mA (paragraphs 2 and 3) on an electrode of 0.8 mm. The instant specification teaches 100,000 ohms, currents below 10 mA, and this corresponds to a resistivity about 2 and 1.5 volts. As the reported variables of Watanabe are identical to that of the instant specification, the resultant resistivity should also be identical, as it has a mathematical relationship.

Regarding claim 12, the doping causes the electrical properties to be more uniform and the electrical properties of the multi-resistive material has greater predictability (abstract).

Regarding claim 13, the doping reduces the temperature sensitivity (paragraph 4, also, the same material and same positive steps would result in the same functional result).

Regarding claim 14, the interface between the electrodes and the multi-resistive material causes an ohmic effect (this is inherent of resistive material between conductive layers.

Regarding claim 15, the interface between the electrodes and the multi-resistive material causes a Shottky effect. (page 3740)

Regarding claim 16, the material may be pervoskite (page 3740).

Regarding claim 17, the pervoskite is a colossal magnetoresistance material (page 3740(page 3740, Watanabe does not use the same term, but refers to the same material).

Regarding claim 18, the pervoskite is a high temperature superconductor (3740).

Regarding claim 19, the doping reduces magnetic field dependence. This is a function of the positive steps preformed. As the positive steps are identical (as are the materials), the same functional result should occur (paragraph 1).

Regarding claim 20, the waveform is either a square, saw-toothed, triangular, sine wave, or some combination thereof, (the list is inclusive of all wave forms, thus it must be one).

Regarding claim 22, the wave form has a duration of 1 nanoseconds to 100 microseconds (page 3739, 10sup3 to 10sup4 cycles per second).

Regarding claim 23, at least two electrical pulses are applied to reversibly chance the resistivity (paragraph 2 and page 3739).

Regarding claim 24, the electrical pulse reversibly changes the resistivity from a high value to a low value or from a low value to a high value (paragraphs 2 and 4) and doping modifies the magnitude of the difference from a high value to a low value (paragraph 2), and an opposite polarity pulse will cause the resistivity to revert back (paragraph 4).

6. Claims 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (Current-driven insulator conductor transition...(pages 3738-3740,

Applied Physics Letters)) in view of Beck (Reproducible switching effect in thin oxide films for memory applications, Applied Physics Letters, pages 139-141).

Watanabe teaches all of the positive steps of claims 21 and 25 as recited above in regard to calim1, except for the maximum value of the selected wavelength between 1 and 15 volts and doping the multi-resistive material with a second dopant.

Regarding claim 21, Watanabe teaches a voltage of 0.5 volts (paragraph 3). Beck also teaches a voltage of 0.5 (paragraph 5), but also teaches the voltage pulses may be performed at 4.8 volts (page 140).

These ranges are considered to involve routine optimization while it has been held to be within the level of ordinary skill in the art. As noted in In re Aller (105 USPQ233), the selection of reaction parameters such as temperature and concentration would have been obvious:

> "Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art. Such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."
>
> In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

One skilled in the requisite art at the time of the invention would have used any ranges or exact figures suitable to the method in the process of changing resistivity regarding voltages using prior knowledge, experimentation, and observation with the apparatus used in order to optimize the process and produce the multi-resistive material structure desired to the parameters desired.

Regarding claim 25, Watanabe is unclear as to a second dopant. Clearly, Watanabe teaches doping with chromium (Cr, paragraph 1), but on page 3740, Watanabe also teaches this process with pervoskites and ions in ferro and antiferroelectrics. Ferroelectrics suggests the doping of iron into the (La,Sr)MnO3 pervoskites. Beck teaches doping with Cr and Fe (iron) to form the reproducible switching effect material (paragraph 1).

It would be obvious to one skilled in the requisite art at the time of the invention to modify Watanabe by including a second dopant (suggested by Watanabe but clearly taught by Beck).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (571)-272-1702. Our facsimile

number all patent correspondence to be entered into an application is (703) 872-9306. The facsimile number for customer service is (703)-872-9317.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David S. Blum

May 2, 2005